IN THE CLAIMS:

Please cancel claim 1 without prejudice so that applicants may pursue it in one or more subsequent applications. Please amend claims 2-9, with insertions indicated by underlined text and deletions by strikethroughs, to read as follows:

1\. (Withdrawn)

1 ~~2~~. (Currently amended) A broad band spread spectrum communications system wherein a transmitter transits a data modulated (M-ary Phase shift keying) MPSK spread spectrum radio frequency (RF) signal, where m data bits are grouped into one symbol, m=log2M is a positive integer and M is the number of keying phases of MPSK signals, to a receiver, said receiver comprises:

b

means for receiving the transmitted data modulated MPSK spread spectrum RF signals, wherein the receiving means comprises a carrier recovery and tracking means, a synchronization means and a data demodulation means, wherein in the ~~The receiver of claim 1, wherein~~ means for receiving, the carrier recovery and tracking means comprises:

a frequency generating means which generates three different frequencies fc+D, fc and fc-D, where fc represents the adjusted carrier frequency and D a positive offset to fc;

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two RF downconverters, each of which comprises two multipliers and a 90° phase shifter, wherein each~~. Each~~ down-converter has two inputs, one connected to receive the transmitted data modulated MPSK spread spectrum signals and the other one connected to receive the locally generated carrier from said frequency generating means ~~generator~~, and two outputs which provide the I-phase and Q-phase of the base-band signals, wherein at least one~~. One~~ downconverter is connected to receive fc+D from said frequency generating means and at least ~~the other~~ one downconverter is connected to receive fc-D from said frequency generating means; and

two X-correlators each of which is connected to receive said I-phase and Q-phase of the base-band signals, wherein the ~~. The~~ I-phase and Q-phase signals are correlated with the local PN-sequence and the~~. The~~ correlation results are processed and outputs from the two X-correlators are used to adjust the frequency generated by ~~the~~ a VCO, which output in turn is fed to said frequency generating means.

2 ~~3~~. (Currently amended) The frequency generating means of claim 1 ~~2~~ consists of three ROM look-up tables which store the locally generated carrier clock values, wherein the~~. The~~

outputs from look-up tables are converted by D/A converter means to generate three different frequencies fc+D, fc and fc-D, where fc represents the adjusted frequency and D a positive offset to fc~~;~~.

3 ~~4~~. (Currently amended) Each X-correlator of claim 1 ~~2~~ comprises two shift registers, a PN generator, two correlators, two square operator circuits, two summers and a storage means for storing a threshold value, wherein the ~~. The~~ parallel shift registers are connected to receive said I- phase and Q-phase of the base-band signals from the RF downconverters ~~of claim 2. Said~~ , wherein furthermore, received I-phase and Q-phase signals are correlated with the local PN-sequence with~~. The correlation~~ results from each of the two correlators ~~are~~ squared, summed and compared with a preset threshold value to obtain the correlation peak value such that said~~. Said~~ correlation peak value is the output of the X-correlator.

4 ~~5~~. (Currently amended) The frequency generated by said VCO of claim 1 ~~2 is~~ being controlled by two X-correlators ~~of claim 4. The~~ such that the difference between output values of the two X-correlators ~~are~~ is amplified and averaged by a low pass filter to form an error signal, wherein the error signal ~~which~~ is fed to the input of the VCO with the~~. The~~ VCO frequency clock ~~is~~ increased when the error is positive and decreased when the error is negative.

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5 ~~6~~. The ~~receiver~~ receiving means of claim 1 ~~2~~~~1~~, wherein the synchronization means comprises N storage means, R1, R2,…, RN, and a subtractor where N is an odd number, wherein the~~. The~~ output from one of the said X-correlators ~~of claim 2~~ is sampled N times per chip, where N is an odd integer greater or equal to three, wherein the~~. The~~ sampled values are stored in sequence in the N-storage means R1, R2,…, RN, wherein a~~. The~~ difference between the sample stored in R1 and the sample store in RN forms the phase error of the chip clock, and wherein furthermore,~~. The~~ sample store in R(N-1)/2 is used for coarse synchronization of the symbol clock.

6 ~~7~~. The ~~receiver~~ receiving means ~~part~~ of claim 1 ~~2~~~~1~~, wherein the data demodulation means comprises:

a RF down-converter, which includes a 90° phase shifter connected to receive the transmitted data modulated MPSK spread spectrum signal~~,. Said~~ the down-converter ~~has~~ having two inputs such that ~~,~~one input is connected to receive the transmitted data modulated MPSK spread spectrum signals and ~~the other one~~ another input is connected to receive the locally generated carrier fc from ~~said~~ a frequency generator ~~of claim 2~~, and

wherein two outputs of the RF down-converter ~~which~~ provide the I- and Q-phases of the base-band signals;

two match filters each connected to said I- phase and Q- phases of the base-band signals;

two one-data-bit-~~dalay~~delay-line each connected to the outputs of said match filters; and

four multipliers, two summers and a phase-table ~~which~~ ~~stores~~ for storing the M-phase values of MPSK modulation.

7 ~~8~~. Data demodulation in the data demodulation means of claim 6 ~~7~~ ~~comprises~~ comprising the following steps:

down converting the received data modulated MPSK spread spectrum RF signal ~~is down-converted~~ by the carrier frequency fc from said frequency generator of claim 2 into I-channel and Q-channel signals;

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de-spreading via said match filters ~~of claim 7~~ ~~de-spread~~ said I-channel and Q-channel signals;

multiplying said de-spreaded I-channel and Q-channel signals ~~are multiplied~~ by their own one-bit-delayed signal and ~~the~~ then summing ~~of~~ these two multiplications to produce the real-part of the phase information for demodulation, which is denoted by COS;

multiplying said de-spreaded I-channel signal ~~is multiplied~~ with the one-bit-delayed said de-spreaded Q-channel signal;

multiplying the ~~while said~~ de-spreaded Q-channel signal ~~is multiplied~~ with the one-bit-delayed said de-spreaded I-channel signal;~~.~~

producing by taking the ~~The~~ difference between the two multiplications to produce the imaginary-part of the phase information for demodulation, which is denoted by SIN;

forming with said SIN and COS signals ~~form~~ a phase pair (COS, SIN);

comparing after~~. After~~ normalization, ~~the~~ a phase pair (COS, SIN)norm ~~is compared~~ with modulating phases stored in said phase-table of claim 6 ~~7~~; and

choosing a phase from the phase table as the demodulating phase such that it~~The phases stored in said phase-table of claim 7 are compared with the normalized phase pair~~

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~~(COS, SIN)norm. The~~ ~~one that~~ is closest to the phase pair (COS, SIN)norm ~~is chosen as the demodulated phase~~.

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8 ~~9~~. Employing the Euler distance measure as a ~~The~~ measure of closeness of said (COS, SIN)norm with phases stored in said phase-table in claim 7 ~~8~~ ~~is the Euler distance measure~~.